TECH OFFER

Continuous Skin-based Sweat Sensor for Rapid Biomarker Detection

KEY INFORMATION

TECHNOLOGY CATEGORY:
Healthcare - Diagnostics
Healthcare - Medical Devices
Electronics - Sensors & Instrumentation

TECHNOLOGY READINESS LEVEL (TRL): TRL5
COUNTRY: HONG KONG
ID NUMBER: TO175005

OVERVIEW

Biomarkers are biomolecules and/or physical characteristics found in the body that give a clear picture of a person's health and fitness. Currently, the golden standard of biomarker testing is through blood tests. However, this method is invasive as it involves drawing blood with a needle. Additionally, blood tests are neither real-time nor continuous which means there is significant delay between testing and receiving results. Such problems can be solved through this invention as this method involves sensing biomarkers within sweat through a skin patch, eschewing the need for needles. Furthermore, the biomarker data can be instantly transmitted to a smartphone application which allows users to continuously monitor their data in a convenient manner.

This technology would be relevant in numerous industries such as sports fitness, beauty, and medical diagnostics; thus, attracting sizable demand for it where there is an unmet need for convenient, accurate and real time detection of accurate biomarkers.

TECHNOLOGY FEATURES & SPECIFICATIONS

The technology consists of the following main parts:

- The underlying substrate of the sweat sensor is made from advanced Ultra High Molecular Weight Polyethylene (UHMWPE) membrane which can adhere to skin without needing any adhesive. The membrane itself has the Janus property which allows biomarkers of interest to enter the sensor on the skin-side while blocking interferents such as water droplets from entering on the opposite side. The sensors use selective biomolecule detection using specially molecularly imprinted polymers (MIP) that binds to a target biomarker to generate a response signal.
- The transducer part converts the biomolecular signal into an electrical signal to be processed and transmitted into the smartphone application.
- The smartphone app interprets and shows the data to the user with the goal of delivering insights on the user's health and fitness.

POTENTIAL APPLICATIONS

There are several potential industries where this technology can be customised:

- Sports Performance Monitoring: This technology can detect changes in lactate levels in athletes. Currently, athletes regularly use invasive blood pricks to obtain insights and improve on their lactate threshold (maximum lactate concentration in blood in which the athletes will experience fatigue). With this technology, athletes can not only bypass the invasive blood pricking but also continuously monitor their lactate levels during training instead of relying on multiple point-in-time measurements that might give an incomplete picture of their fitness levels
- Beauty: Another biomarker this technology can detect is changes in cortisol, a stress hormone that negatively impacts skin health. Beauty-conscious users can apply a skin patch to detect their stress levels and perhaps implement the optimal skin care routine.
- Medical diagnostics: Current biomarker detection methods for medical diagnostics still rely on blood testing, which is invasive and relies on delayed point-in-time measurements. Sweat sensing using this skin-adhering sensor can give continuous non-stop insights to medical providers to optimise care based on the physiological state of the patient.

MARKET TRENDS & OPPORTUNITIES

The global wearable health sensors market size accounted for USD 2.9 Billion in 2022 and is estimated to achieve a market size of USD 14.1 Billion by 2032, growing at a CAGR of 17.4% from 2023 to 2032. (Source: Acumen Research and Consulting). With more people becoming health-conscious, there is an escalating demand for technologies that can assist in monitoring and enhancing their health. Wearable health sensors cater to this need by offering real-time data on a range of health parameters. In recent years, significant research has been targeted toward the development of wearable sensing devices for monitoring biomarker levels in nonobtrusively accessible biofluids such as tears, urine, saliva, and sweat. Sweat could be an ideal candidate for prolonged, semicontinuous, and non-obtrusive health monitoring because sweat is a continuously accessible biofluid containing physiologically and metabolically rich information such as biomarkers.

UNIQUE VALUE PROPOSITION

State of the art for biomarker detection is through using blood tests. This technology is an improvement over blood tests as it is **non-invasive** and i**ncreases user convenience**. It has advantages in delivering **real-time and continuous data** to users which

creates a clearer picture of the user's health and fitness, allowing for rapid action to be taken if necessary. This contrasts with blood tests which usually require a few days between blood taking and results publishing.

This technology is an improvement as it **can measure relevant biomarkers** providing a more insightful view of the user's health and with **modular sensing** (meaning products based on this technology can be easily modified to detect different biomarkers or even detect multiple biomarkers at once). The technology serves as **a platform for customisation with multiple potential use cases** in numerous industries.